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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,576	10/26/2001	Changmin Chun	ECB-0115	4233

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EXAMINER

WILKINS III, HARRY D

ART UNIT PAPER NUMBER

1742

DATE MAILED: 10/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/002,576

Applicant(s)

CHUN ET AL.

Examiner

Harry D Wilkins, III

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 May 2003 and 24 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,6,7 and 9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,6,7 and 9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 28 May 2003 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 6, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramanarayanan et al (US 5,869,195) in view of Applicant's admission of prior art and Garg et al (US 6,287,393).

Ramanarayanan et al teach a method where a pearlitic surface layer is formed on a steel article. Ramanarayanan et al teach (see col 2, line 66 to col 3, line 12) that a surface layer of at least 1 micron is transformed by conventional carburizing methods. The method includes (equivalent to (c) of present invention) slow cooling from the carburizing treatment in order to form the pearlite microstructure.

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Ramanarayanan et al do not teach the claimed method of carburizing of (a) heating to the austenite region and (b) exposing to a supersaturated carbon environment at 727-900°C.

Garg et al teach (see col 5, lines 24-46 and col. 9, lines 38-64) a method of carburizing steel that includes (a) heating at 750-950°C and (b) exposing the steel to a carburizing atmosphere containing CO and H<sub>2</sub>. The atmosphere can contain as much as 50 vol% CO (where  $n=1$  and  $m=0$ , both within the range of Garg et al), with no N<sub>2</sub> added, thus leaving the other 50 vol% to be essentially all H<sub>2</sub>. There would be some residual methane and/or CO<sub>2</sub> in the atmosphere, but not enough to affect the carburizing. Thus, the atmosphere composition taught by Garg et al consists essentially of CO and H<sub>2</sub>. Though Garg et al do not contain any express teachings regarding the saturation or carbon activity of the atmosphere, one of ordinary skill in the art would have expected that with the 50/50 CO/H<sub>2</sub> atmosphere, the carbon activity would have been increased, thereby creating a supersaturated environment, because more carbon in the atmosphere (higher carbon activity) increases the rate of carbon transfer to the iron and also increases the maximum carbon content of the iron (for support, see "Gas Carburizing").

Therefore, it would have been obvious to one of ordinary skill in the art to have performed the conventional heating and carburizing steps as taught by Garg et al as the carburizing treatment of Ramanarayanan et al because the CO/H<sub>2</sub> environment of Garg et al is effective at quickly facilitating carbon transfer to the steel (see Garg et al at col 7, lines 5-24).

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Ramanarayanan et al further teach that an FeS surface layer is formed on top of the pearlite layer in order to add corrosion resistance to acids. However, Applicant admits as prior art (see paragraph 3) that pearlite was known to be resistant to corrosion by organic acids. Therefore, the FeS layer of Ramanarayanan et al is not needed as the pearlite layer provides sufficient corrosion resistance for certain environments.

Regarding claim 2, Ramanarayanan et al teach (see col 2, lines 49-52) that preferred steels include 0.6-0.9 wt% Mn and 0.1-0.5 wt% Si.

Regarding claim 6, it would have been within the expected skill of a routineer in the art to have optimized the time of treatment in order to adjust the depth of the carburized layer that forms pearlite upon slow cooling (for support that treatment time affects carburized depth, see Kerridge at col 3, lines 22-27).

Regarding claim 7, Ramanarayanan et al teach (see col 1, lines 41-42) that the thickness of the pearlitic region is preferably at least 20 microns.

Regarding claim 9, Ramanarayanan et al teach (see col 3, lines 9-12) that when the surface pearlite was formed, only the surface layer was required to have more than 0.7 wt% C. Thus, the bulk alloy of Ramanarayanan et al contains less than 0.7 wt% C.

#### ***Response to Arguments***

4. Applicant's arguments filed 10 January 2003 have been fully considered but they are not persuasive. Applicant argued that neither Ramanarayanan nor Garg teach the carburizing atmosphere as claimed.

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In response to Applicant's argument, Garg et al teach (see col. 9, lines 38-64), as above, a carburizing atmosphere with about 50 vol% CO and the rest being essentially H<sub>2</sub>. Though Garg et al do not contain any express teachings regarding the saturation or carbon activity of the atmosphere, one of ordinary skill in the art would have recognized that the carbon activity in the atmosphere was greater than 1, thereby creating a supersaturated environment, because more carbon in the atmosphere (higher carbon activity) increases the rate of carbon transfer to the iron and also increases the maximum carbon content of the iron (for support, see "Gas Carburizing"). Thus, the presently claimed carburizing atmosphere limitations are taught by the prior art. One of ordinary skill in the art would have been motivated to use the supersaturated atmosphere (50/50 CO/H<sub>2</sub>) because the higher percentage of CO provides for a faster transfer of carbon to the steel (see Garg at col. 7, lines 5-24).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

hdw

Harry D Wilkins, III  
Examiner  
Art Unit 1742

ROY KING  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700

*Handwritten signature/initials*